Ministry of Higher Education and Scientific research



# **Department of Biology**

**College of Science** 

# Salahaddin University/Erbil

# **Subject: Food Microbiology**

## Course Book – (Year 4)

# Lecturer's name: Dana Faiq Hoshiyar (M.Sc.)

# Abdulilah S. Ismaeil (Ph.D.)

# Nishtiman S. Hasan (M.Sc.)

### Academic Year: 2022/2023

# CourseBook

1. Course name	Food Microbiology ( Theory and Practical)
2. Lecturer in charge	Dana Faiq Hoshiyar , Abdulilah S. Ismaeil and Nishtiman
	S. Hasan
3. Department/ College	Biology/Science
4. Contact	e-mail:
	dana.mustafa@su.edu.krdTel:
	07504520237
	abdulilah.ismaeil@su.edu.krd
	Nishtiman.hasan@su.edu.krd
	Tel: (+9647507975805)
5. Time (in hours) per week	Theory: 2
	Practical: 2
6. Office hours	2 hrs. / week (twice = 4hrs.)
7. Course code	SBIO 403

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8. Teacher's	<b>Education</b>	
academicprofile		
L L	1-Baccalaureate, Baghdad	
	College/Baghdad(Secondary school), 1971	
	2-B.Sc. degree in Food Science, 1975/ College	
	of Agriculture/University of Baghdad	
	3 M Sa Dagraa in Food Sajanga (Food	
	J-MI, SC. Degree III FOOD SCIENCE ( FOOD	
	Microbiology ), 1978 /College of	
	A anioulture/University of Deahded	
	Agriculture/University of Bagndad.	
	<u>Scientific Posts</u> 1-Assistant lecturer from 30/4/1980. 2- Lecturer from 2/11/1984. 3- Assistant Professor from 9/12/1989. <u>Places of Posts</u> :- 1- Department of food science ,College of	

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Ministry of Higher Education and	<ul> <li>Scientific research</li> <li>Agriculture , University of Sulaimanyaia from30/4/1980 to 31/8/1981.</li> <li>2- Department of food science ,College of Agriculture , University of Salahaddin from1/9/1981 to 31/8/1987.</li> <li>3- Department of Biology ,College of Science,University of Salahaddin from</li> </ul>	
9. Keywords	Food microbiology, Food preservation, Food spoilage,Food poisoning.	
10. Course overview:		

### Food Microbiology (First Semester) Course Overview

The course introduces the basic concepts of food microbiology.

Food Microbiology includes an overview of groups of microorganisms important in food (bacteria, moulds, yeasts) with factors effecting on their growth in food.

Also the course includes the sources of food contamination with microorganisms, spoilage of food products by microorganisms, methods of food preservation.

Also includes the important food pathogens and methods of prevention and controlling them.

Also the course includes the microbiological quality and safety of foods.

### **<u>11. Course Objectives (Food Microbiology)</u>**

\* Understand what factors influence microbial growth in foods.

\* Understand the causes of food spoilage and predict the microorganism that can spoil a given food, when prepared, processed and stored undergiven conditions.

\* What methods and principles can be used for controlling microbial contamination and for preventing subsequent growth of undesirablemicroorganisms in raw and processed foods.

\* Understand the causes of food borne microbial diseases and predict thepathogens that can grow in a given food, when prepared, processed and stored under given conditions.

\* Be able to predict the necessary measures to control the spoilage and pathogenic microorganisms in food.

\*What procedures can be used for reducing health hazards associated with foods and for extending the shelf-life of foods?

\* Be able to identify the microbiological criteria.

#### 12. Student's obligation

- **1.** The student should attend the class regularly, participation is important forUnderstanding the lecture.
- 2. Absences are allowed only for necessary excuse and according to theInstructions of absences.

**3**.The student should take 1-2 exams through the semester and a final exam (2attempts).there will be no makeup exams for absences students without a reasonable excuse and must be with documents.

4. Talking is not allowed during the lecture.

5. Questions & distinguishing by the students are preferred.

13. Forms of teaching Course book and power point & white board.

14. Assessment scheme

**1.** Theoretical exam = 65% practical exam = 35%

**2.** Theoretical exam = 15% for the semester exam and 50% for the final

Practical exam35%. for the semester exam

- **3.** Examinations: 20%
- 4. Assignments: 15%

**15. Student learning outcome:** 

**1.** learn and understand the interrelationship of microorganisms withFoods and their role in food spoilage & food poisoning.

2. Learn & understand the different methods of food preservations.

**3**. Predict the impact of food production and food handling.

- 4. Discuss the detection and enumeration of microorganisms in foodsIncluding the spoilage & food poisoning microorganisms.
- 5. Identify the indicator microorganisms and microbiological criteria.

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6. Identify the important pathogens and spoilage microorganisms in foods and understand the role of environmental factors (i.e. aw, pH, temperature, oxidation-reduction potential) on the growth and Response of microorganisms.

**16. Course Reading List and References:** Food Microbiology

#### **Course Reading List**

1- Garbutt, John, 2000. Essentials of food microbiology. Arnold( London,Sydney, Auckland)

2- Adams, M.R. and Moss M.,O. 2008. Food Microbiology, 3 rd Ed. RSCpublishing.

3- Jay, J. M., M. J. Loessner, and D. A. Golden. 2005. Modern foodmicrobiology, 7th ed.Springer, New York, NY.

4- Ray, B., Buhnia, Arun. 2008. Fundamental food microbiology, 4rd Ed. CRCPress, Boca Ratan, FL.

5- e-book sites (http://gigapedia.com , http.//www.scribd.com)

6- Journals of particular interest to Food Microbiology :-

Journal of Applied and Environmental Microbiology; Journal of Applied

Microbiology, Journal of Dairy Science, Journal of Food Protection, Journof Food Safety, Journal of Food Science, International Journal of Food Microbiology.

17. The Topics:

Lecturer's name

Food Microbiology Course programmed (	Dana Faiq Hoshiyar (2brs) (Theory)
<u>weekly)</u> (First semester)	(2ms) (1moery)
1. An Introduction of the groups of	
microorganisms important in food with the	
factors effecting on growth of	
microorganismsin food.	
2. Sources of food contamination and methods	
of controlling them.	
What determines the composition of	
thespoilage microflora.	
3. General basis of food preservation.	
4. Food preservation by Low	
<b>Temperature(cooling, freezing) and</b>	
their effects on microorganisms.	
5. Food preservation by using High	
temperature (Pasteurization, sterilization)	
and their effectson microorganisms.	
6. Food preservation by drying, preservatives	
and radiation and their effects on	
microorganisms.	
7. Microbial food spoilage & the factors	
affectfood spollage by microorganisms.	
8. Microbial spoilage of milk and milk products.	
9. Microbial spoilage of cereal products	
10. Microbial spoilage of fruits and vegetables.	
11. Microbial spoilage of sugar and sugar products	
(juices, honey , beverages , etc)	
12. Microbial spoilage of meat , poultry and fish .	
13. Microbial spoilage of egg and canned foods .	
14. Food borne pathogens.	
15. Microbiological criteria .	
18. Practical Tonics	
	1

### Food Microbiology

### Week 1

An introduction of food microbiology

In this lab.

**1**-Description the microorganisms which have negative relationship with foods.

**2**-Describe the differences between food poisoning & food spoilage.

### Week 2

Methods for microbial examination of food

1- Direct microscopic count (DMC).

### Week 3

- 2- Total colony count
  - **a.** pour plate method
  - **b.** spread plate count

### Week 4

**3-** Most probable number (MPN)

### Week 5

Dye reduction test (Raw milk test).

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(Practical)

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Week 6	
Laboratory pasteurization count method (LPC).	
Week 7	
Food preservation by high temperature	
Week 8	
Food preservation by preservative.	
Week 9	
Meat and meat product spoilage.	
Week 10	
Cereal and cereal product spoilage	
Week 11	
Spoilage of vegetables and fruits.	
Week 12	
Isolation of <i>Staphylococcus aureus</i> from foodsamples.	
Week 13	
Isolation of Bacillus cereus from food samples.	
Week 14	
Isolation of E. coli from food samples.	
Week 15	
Isolation of Clostridium perfrengens from food samples.	

#### **19. Examinations:**

#### Sample of a final examination

Q.1) Through a graph or sketch show the followings :- (Answer only two) (16 marks)

1- How a pH approaching the minimum influences the growth curve of an organism .

2- Interactions involved in the selection of spoilage microflora.

3- The growth of bacterial spoilage and its relationship to the spoilage symptoms.

Q.2) Define the followings :- (Answer only four) (12 marks)

Thermal Death Time - Mycotoxins - Food infection - Microbiological Standards - F value -

Q.3) Give the main effects of the followings on microorganisms :(Answe:-(Answer only two) r only two) (12 marks)

1- Preservatives2- Slow freezing3 - DryingQ.4) Give reasons for the followings with examples :-(Answer onlyseven)(21 marks)

1-Acid curdling in raw milk2-Flat sour in acid cannedfoods3-Organic acid fermentations in juices4-Sour bread5- Black rot in egg6-Rancidity of fish

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7-Sulfide stinker Spoilage in canned foods	8-Surface film in pickles			
9-Bitternes in cheese	10-Soft rot in fruits and			
vegetables.				
Q.5) Give brief notes for the followings :-	(15			
marks)				
1- Effect of water activity as a factor effecting on heat resistance of microorganisms.				
2- The growth of microorganisms in relation to	p redoxpotential and the			
redox of foods.	L			
3- Effect of age of microorganisms as a factor	effecting the destruction of			
microorganisms	C			
by radiation.				
Q.6)	(14marks)			
1- Only enumerate the sources of fish contamination.				
2-For Botulism give the followings:-				
Causative agent – The symptoms -	Foods involved			
20. Extra notes:				
21. Peer review				